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December 14, 2018

VIA ECFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

REDACTED – FOR PUBLIC INSPECTION

Re: Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations; WT Docket No. 18-197

Dear Ms. Dortch:

Pursuant to Section 1.1206(b) of the Commission's Rules, 47 C.F.R. § 1.1206(b), notice is hereby provided of a written *ex parte* presentation in the above-referenced docket. Attached please find additional information regarding the estimation of diversion rates appropriate for assessing the competitive effects of the proposed merger of Sprint and T-Mobile, including a discussion of the merits of various sources of switching data that were examined as part of the analysis reported in the Israel, Katz, and Keating declaration.¹

This filing contains NRUF/LNP Confidential Information and information that is "Highly Confidential" pursuant to the Protective Order filed in WT Docket No. 18-197.² Accordingly, pursuant to the procedures set forth in the Protective Order, a copy of the filing is being provided to the Secretary's Office. In addition, two copies of the Highly Confidential Filing are being delivered to Kathy Harris, Wireless Telecommunications Bureau. A copy of the Redacted Highly Confidential Filing is being filed electronically through the Commission's Electronic Comment Filing System.

¹ Mark Israel, Michael Katz, and Bryan Keating, "Reply Declaration of Mark Israel, Michael Katz, and Bryan Keating," WT Docket No. 18-197 (Sept. 17, 2018).

² Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Assign Licenses, Protective Order, WT Docket No. 18-197 (June 15, 2018).



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Please direct any questions regarding the foregoing to the undersigned.

Respectfully submitted,

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/s/ Nancy Victory

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**ADDITIONAL INFORMATION REGARDING THE ESTIMATION
OF DIVERSION RATIOS**

Mark Israel, Michael Katz, and Bryan Keating

December 14, 2018

In this note, we provide additional information regarding the estimation of diversion rates appropriate for assessing the competitive effects of the proposed merger of Sprint and T-Mobile, including a discussion of the merits of various sources of switching data that were examined as part of the analysis reported in the Israel, Katz, and Keating declaration.¹

Before turning to the various sources of switching data, we address a more fundamental and important issue: Switching rates are, at best, rough proxies for the diversion ratios, and the latter are the relevant metrics for assessing the competitive effects of mergers. Diversion ratios measure the degree to which buyers would substitute to other products in response to a price or quality change and, thus, are important determinants of the effects of a merger on price- and quality-setting incentives. By contrast, switching rates capture all consumer movements between products, including those that have nothing to do with price or quality changes. For example, a consumer may switch service providers because he or she has moved to another state or suffered a bout of unemployment. The Commission has previously recognized both that diversion ratios are the relevant metrics for merger analysis and that switching rates are not diversion ratios.²

Critically, the discussion of which switching rates to use as proxies for diversion ratios has largely been rendered moot by the fact that there are now much better measures of diversion ratios in the record than were available to the Commission when it previously relied on porting data as proxies for diversion ratios. Specifically, John Asker, Tim Bresnahan, and Kostis Hatzitaskos (ABH) have submitted a white paper describing a sophisticated structural model of consumer demand utilizing detailed individual-level micro data from the Nielsen Mobile Performance product with which they directly calculate true diversion ratios based on own- and

¹ Mark Israel, Michael Katz, and Bryan Keating, “Reply Declaration of Mark Israel, Michael Katz, and Bryan Keating,” September 17, 2018, WT Docket No. 18-197 (hereinafter *IKK Declaration*).

² Staff Analysis and Findings, *In the Matter of Applications of AT&T Inc. and Deutsche Telekom AG for Consent to Assign or Transfer Control of Licenses and Authorizations*, WT Docket 11-65, rel. November 29, 2011 (hereinafter *AT&T/T-Mobile Commission Staff Report*), Appendix C, ¶¶ 8, 10.

cross-elasticities.³ The ABH results are thus far superior estimates of diversion ratios than are switching rates.

The ABH analysis estimates diversion ratios that lie at the lower end of the range of estimates that we used in the *IKK Declaration*: [REDACTED] percent from Sprint to T-Mobile and [REDACTED] percent from T-Mobile to Sprint.⁴ Relative to the range of rates that we considered, these estimates are lower than all but the rates based on share of subscribers (SoS) and the Sprint-to-T-Mobile rate from the Sprint survey.⁵

I. Record Evidence Demonstrates that the LNP or Porting-based Data are Inferior to HarrisX and other Survey Data as Bases on which to Estimate Diversion between the Merging Parties

Although the ABH estimates provide direct estimates of diversion ratios, rendering the use of switching-based proxies unnecessary, in what follows, we provide information considering the relative merits of different sources of switching data.

In the *IKK Declaration*, we utilized estimates of diversion rates based on the HarrisX survey in our baseline analysis and utilized other sources in a range of sensitivity analyses.⁶ We considered using porting data among our various runs, but concluded that these data are unreliable because they are biased—in large part because they systematically understate switching to mobile virtual network operators (MVNOs).

Although the Commission has determined in previous transactions that porting data offered the best available proxy for diversion ratios, the Commission has also recognized the deficiencies in

³ John Asker, Timothy F. Bresnahan, and Kostis Hatzitaskos, “Economic Analysis of the Proposed T-Mobile/Sprint Merger,” November 6, 2018, WT Docket No. 18-197 (hereinafter *ABH White Paper*), § 3.

⁴ *ABH White Paper*, ¶ 79.

⁵ *IKK Declaration*, Table 28. As described further in Section III below, in that table, we allocate TracFone and other MVNOs to AT&T, Verizon, T-Mobile, and Sprint in order to compare switching rates with the porting data. Because the ABH model does not include such allocations, we modified the diversion ratios reported in Table 28 of the *IKK Declaration* to remove these allocations for purposes of this comparison.

⁶ Specifically, we considered switching data based on Sprint surveys (described further below). We also calculated diversion ratios proportional to share of gross additions (SoGA), share of deactivations (SoDA), and SoS. These sources generate a wide range of estimated diversion ratios. Estimated diversion ratios from Sprint to T-Mobile range from [REDACTED] percent (based on SoS data) to [REDACTED] percent (based on porting data). Estimated diversion ratios from T-Mobile to Sprint range from [REDACTED] percent (SoS data) to [REDACTED] percent (porting data). Notably, the HarrisX Mobile Insights survey yields estimated diversion ratios toward the upper end of this range ([REDACTED] percent from Sprint to T-Mobile and [REDACTED] percent from T-Mobile to Sprint). For a summary, see *IKK Declaration*, Table 28.

porting data.⁷ Specifically, Commission staff previously recognized that (a) customers do not necessarily port their numbers in response to price or quality changes;⁸ and (b) only a subset of switching customers port their numbers and thus appear in the porting data.⁹

The reasons that LNP or porting data do not provide a reliable estimate of diversion are worth explaining further.¹⁰ As we will now summarize: (a) survey data indicate that porting data yield biased estimates of diversion; (b) there is an economic mechanism that gives rise to this bias and is recognized by industry participants; and (c) the parties have concluded in the ordinary course that porting data are unreliable.

Survey data indicate that porting data yield biased estimates of diversion. As we explained in the *IKK Declaration*, an important problem with using porting data to infer diversion ratios is that many customers do not port their numbers when switching between mobile network operators, and those customers who do port may not be representative of all switchers.¹¹ The extent to which porting data are unrepresentative of overall consumer switching behavior can be seen from data that separately identify the switching patterns of consumers who port their numbers and those who do not. In particular, a survey of customers who port out from Boost finds that approximately [REDACTED] percent of ports go to T-Mobile (including what is now Metro by T-

⁷ *AT&T/T-Mobile Commission Staff Report*, Appendix C, ¶ 10.

⁸ For a discussion of the issues associated with using switching rates as estimates of diversion ratios, see Yongmin Chen and Marius Schwartz (2016), “Churn vs. Diversion: An Illustrative Model,” *Economica*, **83**(332): 564-583. Chen and Schwartz state that it is widely recognized that churn or switching rates can differ from diversion ratios depending on the factors that cause the switching. In particular, the authors conclude that, when little is known about the causes of switching, less weight should be given to conclusions based on the use of switching rates as proxies for diversion ratios.

Although we found that “porting rates following pricing promotions by Sprint and T-Mobile (which should be influenced by price changes) generally are similar to the porting rates immediately before the promotions (which are not influenced by price changes),” this fact does not provide a basis for reliance on porting data. (*IKK Declaration*, ¶ 174.) In particular, it does not resolve the biases in porting data described above. The ABH model is more complete in that it evaluates switching among all products, and it offers a more direct measure of diversion ratios.

⁹ *AT&T/T-Mobile Commission Staff Report*, Appendix C, ¶ 10.

¹⁰ The Parties do make use of porting data in the ordinary course of business but recognize, as we describe below, its shortcomings. An important advantage of porting data over other sources of switching data is that it is available at a high frequency (e.g., daily). The availability of high-frequency porting data provides the Parties with quick feedback on the effects of various initiatives. However, this advantage does not mean that porting data provide the most accurate estimate of diversion or even switching rates. As we explain below, the Parties’ documents indicate that other sources of switching rates are more accurate.

¹¹ *IKK Declaration*, ¶ 175.

Mobile), while only [REDACTED] percent of ports go to TracFone or other MVNOs.¹² By contrast, only [REDACTED] percent of non-port switch outs from Boost go to T-Mobile (including Metro by T-Mobile), while approximately [REDACTED] percent of non-port switch outs from Boost go to TracFone or other MVNOs.¹³ In short, consumers who port their numbers exhibit a much higher diversion rate from Sprint to T-Mobile than do consumers who do not port their numbers. Because ports account for only [REDACTED] percent of total switches,¹⁴ and ports do not constitute a random sample of such switches, porting data present a distorted picture of overall consumer behavior.

There is an economic mechanism that gives rise to this bias and is recognized by industry participants. A key reason that porting data are likely to overstate switching between Sprint and T-Mobile is that: (a) porting promotions have a significant influence on the degree to which consumers port their numbers, and (b) some carriers—notably, MVNOs—make much less use of porting incentives than do others.¹⁵ As a result, the pattern of ports is unrepresentative of the pattern of overall diversion. In particular, the bias in porting data understates the degree of diversion to MVNOs and, thus, overstates diversion to mobile network operators (MNOs) such as Boost and MetroPCS.

This bias arises because MNO brands such as Boost and MetroPCS offer incentives for customers to port their numbers when switching carriers.¹⁶ MNOs do so because they have found that new customers who port their numbers tend to stay with their new carrier longer than do new customers who do not port their numbers and, thus, have higher lifetime customer

¹² SPR-FCC-02425213 at SPR-FCC-02425217.

¹³ SPR-FCC-04301172 at SPR-FCC-04301177.

As another example, in late 2017 T-Mobile found that [REDACTED] percent of MetroPCS customers that switched to Xfinity Mobile were non-ports. (TMUS-FCC-07652903.) T-Mobile has also found that only [REDACTED] percent of customers switching away from MetroPCS port their number, while [REDACTED] percent of customers switching away from T-Mobile postpaid port their number. (*Id.*)

¹⁴ *IKK Declaration*, ¶ 176.

¹⁵ Interview with Angela Rittgers, Senior Vice President of Sales and Marketing for the Sprint Prepaid Group, December 11, 2018.

¹⁶ MetroPCS has made porting promotions a regular part of its customer acquisition strategy. TMUS-FCC-01921550 (“In July 2015, MetroPCS started offered [*sic*] a free Samsung Galaxy Core Prime w/ port – this is when port:GA mix dramatically increased & free phone porting offers became the norm at MetroPCS.”). Other MNO prepaid brands have also consistently used porting promotions. See TMUS-FCC-03647703, TMUS-FCC-07733394, TMUS-FCC-00835662, TMUS-FCC-07679312, TMUS-FCC-05804608, and TMUS-FCC-02469982 for multiple examples of porting-based promotional offers from Verizon, AT&T, and Sprint prepaid brands in 2016-2018.

values.¹⁷ By contrast to MNOs, MVNOs rarely offer porting promotions.¹⁸ One reason that MVNOs do not offer porting promotions is that MVNOs make extensive use of third-party distributors such as Walmart and it is difficult to facilitate such promotions when using such distributors, which results in low rates of porting.¹⁹ The effects of the form of retail distribution and the use of promotions can be seen from the data. For example, in Sprint's Boost sales data, the rate at which a gross addition ports its number to Boost is approximately [REDACTED] times higher when the transaction occurs at a Boost branded store than through a national retailer.²⁰ Another reason that MVNOs make less use of porting promotions than do MNOs is that lifetime customer values for new acquisitions are lower for many MVNOs than for MNOs, giving MVNOs less financial incentive to induce porting.²¹ The bottom line is that, whatever the reason for the differences in operators' propensities to offer porting promotions, porting data systematically understate diversion ratios to MVNOs.²²

The parties have concluded in the ordinary course that porting data are unreliable. T-Mobile does not consider porting data to be a reliable basis for decision making because these data provide a noisy signal of switching rates, do not cover the majority of switches that occur, and provide "an incomplete and strongly biased" view of marketplace flows and trends.²³ Ordinary

¹⁷ Interview with Angela Rittgers, Senior Vice President of Sales and Marketing for the Sprint Prepaid Group, December 11, 2018; interview with Thomas Keys, President and COO of Metro by T-Mobile, December 11, 2018.

¹⁸ Interview with Angela Rittgers, Senior Vice President of Sales and Marketing for the Sprint Prepaid Group, December 11, 2018.

¹⁹ The specific mechanism is the following. National retailers generally do not activate phones at the point of sale. As a result, wireless operators selling services through national retailers cannot offer promotions (e.g., a device discount tied to the customer's porting her phone number) because the operator cannot verify that the customer will port her phone number at the point of purchase. (Interview with Angela Rittgers, Senior Vice President of Sales and Marketing for the Sprint Prepaid Group, December 11, 2018; interview with Thomas Keys, President and COO of Metro by T-Mobile, December 11, 2018.)

²⁰ Approximately [REDACTED] percent of gross additions at branded stores port their numbers to Sprint, while only approximately [REDACTED] percent of gross additions at national retailers port their numbers. (SPR-FCC-01090636.)

²¹ Interview with Thomas Keys, President and COO of Metro by T-Mobile, December 11, 2018.

²² A T-Mobile document indicates that: (a) MetroPCS porting promotions result in significant volatility in MetroPCS porting as a percentage of gross additions; and (b) that the ratio of MetroPCS port-outs to deactivations is affected by port-in promotions by Boost and Cricket, among others. (TMUS-FCC-00712494 at TMUS-FCC-00712544.)

²³ Interview with Mark Roettgering, Senior Vice President of Marketing Engineering at T-Mobile, December 11, 2018. Similarly, the President and COO of Metro by T-Mobile stated that "The non-porting flow is the most important part to us because it is so large." (Interview with Thomas Keys, President and COO of Metro by T-Mobile, December 11, 2018.)

course company documents similarly recognize the limits of using porting data as a proxy for switching, especially for prepaid products.²⁴ For example, one T-Mobile document lists among the limitations of porting data the fact that there is “[n]o visibility into non-porting population” and the view that porting data are “[m]uch more accurate for Postpaid than for Prepaid.”²⁵ Another T-Mobile document states that “the ability to use porting as an indicator of performance declines sharply as you move down the food chain: prime > subprime > prepay > MVNO > (MINT = IOT = M2M = useless).”²⁶

Due in part to these limitations of porting data, T-Mobile regularly uses HarrisX survey data for purposes of analyzing switching rates between wireless carriers.²⁷ MetroPCS also conducts its own deactivation survey, which yields even lower switching rates between Sprint and T-Mobile than do the HarrisX data.²⁸

II. Further Explanation of How the *IKK Declaration’s* Merger Simulation Utilized the HarrisX Survey Data

When using the HarrisX survey data (as well as other data sources) to calibrate the nesting parameters in our merger simulation model, we exclude intra-firm migrations *within the same prepaid/postpaid segment* from both the numerator and the denominator of the diversion ratio estimates. We include intra-firm migrations *across prepaid/postpaid segments* in the calculation of the denominator of the diversion ratio estimates.

The “other” category of responses is in the denominator of all our diversion ratios. It is not in the numerators of any diversion ratios we compute, as we do not compute diversion ratios between individually identified brands and the “other” category.

As discussed on our November 13, 2018, telephone call with Commission staff, we use the diversion ratios calculated as described above to calibrate the nesting parameters of our

²⁴ See, e.g., TMUS-FCC-04252052; See also TMUS-FCC-01914010. T-Mobile documents also refer to porting data. T-Mobile utilized such data because they are available on a nearly contemporaneous basis (as compared to information gleaned from public company reports or through commissioned surveys), and the company has constantly sought to identify better sources of data. (Interview with Mark Roettgering, Senior Vice President of Marketing Engineering at T-Mobile, December 11, 2018.) What is now Metro by T-Mobile has also used porting data, but has done so because of the limited availability of alternatives—not because the company believes that the data are of high quality or unbiased. (Interview with Thomas Keys, President and COO of Metro by T-Mobile, December 11, 2018.)

²⁵ TMUS-FCC-01909049 at TMUS-FCC-01909051.

²⁶ TMUS-FCC-01914010.

²⁷ See, e.g., TMUS-FCC-06791239; TMUS-FCC-01887976; TMUS-FCC-05233277; and TMUS-FCC-00712494. See also TMUS-FCC-00796583 and TMUS-FCC-05216865.

²⁸ TMUS-FCC-07675268 at TMUS-FCC-07675282, 88; TMUS-FCC-05216523 at TMUS-FCC-05216540, 45.

simulation model. These nesting parameters are just one input into the calculation of competitive effects in our simulation.²⁹ Critically, the particular diversion ratios used to calibrate the nesting parameters are not the diversion ratios used to calculate competitive effects. Because the model is just identified, the calibration process uses only two diversion ratios. By contrast, our analysis of competitive effects accounts for the full set of interfirm diversion ratios between all products available to customers, and it appropriately applies the pre- and post-merger ownership structure of all brands in doing so.³⁰

III. Further Explanation of How the Gross Add, Deactivation, Port-In, and Port-Out Figures Used in the *IKK Declaration* were Calculated

The specific gross add, deactivation, port-in, and port-out figures used in the *IKK Declaration* are described in the backup materials provided at the time that our declaration was submitted. Here, we offer a summary description of the process by which the figures were calculated and identify the specific files on which we relied.

To calculate the figures in paragraph 176, Table 27, and Table 28 of the *IKK Declaration*, we aggregate brands to ensure comparability across different data sources that aggregate brands in different ways. For example, the LNP data group MVNOs with the MNOs on which they operate. By aggregating brands to common groupings, we ensure that we treat brands consistently across data sources.

In order to implement this aggregation, we take the following steps: (1) calculate firm-level switches excluding all intra-firm migrations; (2) allocate TracFone's switches, subscribers, gross additions, and deactivations among AT&T, T-Mobile, and Verizon in proportion to their share of TracFone's minutes of use;³¹ and (3) allocate ports and switches of carriers other than AT&T, Sprint, T-Mobile, and Verizon among these four carriers in proportion to their share of gross additions or deactivations.

We use all wireless-to-wireless ports (after dropping intra-firm migrations) in the 2017 LNP data to calculate the total port-in and port-out figure reported the *IKK Declaration*.³² We derive gross

²⁹ *IKK Declaration*, n. 157.

³⁰ See *IKK Declaration* backup materials, "Analyses\Merger Simulation\Matlab Programs - Nested Logit\FOC.m".

³¹ We apply this allocation because the LNP data attribute MVNOs to facilities-based carriers.

³² See *IKK Declaration* backup materials, "Analyses\Diversion Ratios\Ports vs GAs and Deacts\Code\Total Ports and Deacts.do" and "Analyses\Diversion Ratios\Import Data\Code\Import Data.do".

additions and deactivations from T-Mobile's ordinary course competitive analysis data, which T-Mobile calibrates to each carrier's public financial statements.³³

IV. Additional Description of Survey Data Relied Upon by the Parties in the Ordinary Course and Utilized in the *IKK Declaration* to Estimate Diversion Ratios

The demand model described in the *ABH White Paper* demonstrates that the switching rates in the various sources we relied upon very likely overstate the relevant diversion ratios for analysis of the transaction. Nevertheless, we provide additional information regarding two of the surveys utilized in the *IKK Declaration*:

- *HarrisX Mobile Insights*.³⁴ HarrisX's Mobile Insights survey is based on a survey of approximately 30,000 respondents who are interviewed on a monthly basis. Respondents are 13 years old or older, and the target population consists primarily of mobile telephone subscribers with a small portion of the sample reserved for non-mobile users. HarrisX primarily collects survey responses online, and respondents can respond on any device type, including a mobile device, tablet, or laptop/desktop. As part of the survey, HarrisX asks about switching behavior in the prior 12 months. HarrisX weights its survey responses to match demographic and geographic data from the U.S. Census Bureau as well as wireless subscriber benchmarks. HarrisX calculates weights separately for each of the 103 CSA/MSA markets that it surveys. HarrisX weights on: Age, Gender, Household Size, Annual Income, Marital Status, Race/Ethnicity, Wireless Provider, and Acculturation Level (Hispanic).
- *Sprint Switching Survey*.³⁵ Sprint relies on Research Now ("RN") to regularly administer the Research Now/Sprint Promoter Score Survey on Sprint's behalf. Among other functions, these survey responses can be used to calculate switching rates between various mobile wireless brands. On a quarterly basis, the survey is administered to a representative population of 10,000 consumers. At the national level, the responses are balanced for age, gender, ethnicity, income and geographic region (based on U.S. census data). The survey has a Sprint segment that collects data from approximately 7,000 Sprint customers, along with a soft quota of 200 Sprint customers in each of the top 20 CBSAs. The Sprint customer responses collected are balanced to align with Sprint's base demographics and geographic region. Sprint utilizes the reports from Research Now to

³³ See *IKK Declaration* backup materials, in particular "Industry GA estimates based on carrier financials.xlsx", "T-Mobile Deact Estimates.xlsx", and "T-Mobile Subs Estimates Append.xlsx", located in the folder "Analyses\Diversion Ratios\Import Data\Input".

³⁴ The description provided in this paragraph is based on HarrisX Mobile Insights Methodology Overview (provided in our backup materials).

³⁵ The description provided in this paragraph is based on SPR-FCC-12521047; SPR-FCC-12521049; SPR-FCC-12521050; SPR-FCC-12521051; SPR-DOJROG-00021696.

understand and track its Sprint Promoter Score (which is equivalent to the Net Promoter Score used by other firms in the industry).

V. Use of the Average of Switch-In and Switch-Out Rates to Estimate Diversion Ratios in the *IKK Declaration*

In the analysis reported in the *IKK Declaration*, we used the average of switch-in and switch-out rates to estimate diversion ratios. We did so because it makes use of all of the relevant data. For wireless carriers, both retention of existing customers (preventing potential switch-outs) and competing for new customers (attracting potential switch-ins) are relevant to pricing incentives. Because both are relevant but we ultimately need to calibrate to a single switching rate, we use the average of switch-in and switch-out rates to make the most complete use of the available switching data.

Our conclusions are robust to the use of diversion ratios based on only switch-ins, only switch-outs, or the average of switch-ins and switch-outs. Specifically, using switch-out-based diversion ratios raises the critical efficiencies threshold by only \$0.01-0.02/subscriber/month both in the baseline scenario and in the most conservative scenario with an industry elasticity of -0.1. Conversely, using switch-in-based diversion ratios make the merger appear more favorable, reducing the critical efficiencies by \$0.03-0.04/subscriber/month. In all cases, the critical quality efficiencies are less than the value of the merger-specific quality improvement that we estimated.